CPSC/ECE 3220-002 – In-Class Activity 2 – January 14, 2021 Name: Dylan Mumm

Consider the three command lines:

```
% gcc my_prog.c
% ./a.out < in1 > out1 & ./a.out < in2 > out2
% ./a.out < in3 | ./a.out > out3
```

1. In response to the second command line, are there one or two programs running? Are there one or two processes running?

   One program = my_prog.c
   Two processes = each instance of one program

2. In response to the third command line, are there one or two programs running? Are there one or two processes running?

   One program, two processes

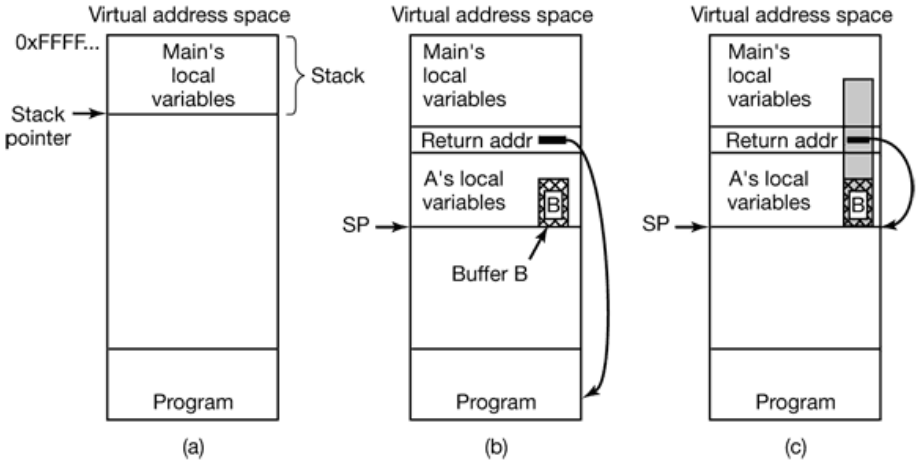
3. What is the difference between the second and third command lines?

   2: separate input and output for processes
   3: piping output of first process as input of second process

Kernel mode / User mode. Circle **one or both** of K and U, as applies.

4. K / U In this mode add instructions can be executed.
5. K / U In this mode only a subset of the instructions can be executed.
6. K / U In this mode only a subset of the physical memory addresses can be accessed.

7. Consider the changes in the memory image of a process during a buffer overflow attack, as illustrated below. Identify at least one way in which the attack can be prevented. (diagram source: stackexchange)



execution starts in main()

main() calls A()

buffer overflow after a call to strcpy() returns to A(); the return address to main() has been overwritten

Can be prevented by marking stack as non executable